# Envirocare Trip Report

On February 24, 1998, members of the Office of Solid Waste (N. Hunt, R. Joglekar, A. Klinger, G. Ordaz, and C. Rhyne) visited Envirocare of Utah, Inc. in Clive, Utah. We were accompanied by two members of the Utah Department of Environment.

We visited Envirocare's low level waste (LLW) and low level mixed waste (LLMW) storage and disposal facilities, and the low level mixed waste treatment facility. The following is a summary of our discussion.

## Disposal Facility Design and Operation

Envirocare reported that their annual rainfall is 4.8". The soil at the facility is impermeable clay, and the stagnant potable water is 1200 feet below. Envirocare started to dispose NORM (Naturally Occurring Radioactive Material) in 1988, and added the LLW and LLMW disposal facilities a few years later. Envirocare's LLMW disposal facility was constructed in accordance with the 1987 "Joint NRC-EPA Guidance On A Conceptual Design Approach for Commercial Mixed Low Level Radioactive And Hazardous Waste Disposal Facilities". Starting at the bottom it contains: 3 ft of clay soil, two sets of High Density Polyethylene (HDPE) liners each with leachate collection and removal systems, 2 ft of clay soil, a layer of HDPE, 2 ft of clay soil, mixed waste, 7 ft of clay soil, a layer of HDPE, and a layer of rocks on the very top. The NRC facility design requirement provides for 500 years of protection for the groundwater for the radioactive components.

At Envirocare, wastes are disposed above ground, and all wastes are emptied out of the containers prior to disposal. Wastes are compacted by bull dozer after placement in the disposal cell to avoid slumping. Waste containers are either cleaned and shipped back to the waste generators for reuse, or compacted and disposed as wastes. Wastes from different generators are "separated" in the landfill, as required by RCRA, in the sense that they are not commingled and records are kept to identify each generator's waste disposal location. However, wastes from different generators are spread in layers on top of each other. Environmental monitoring is conducted to determine possible contamination in groundwater, air, and animal.

## Mixed Waste Accepted at Envirocare

Envirocare has both a NRC licence and RCRA part B permit, and can accept characteristic mixed waste and mixed waste with most F,K,P,U codes. However, since they only have stabilization treatment capability, they can only accept mixed wastes with very low organic contents. The metals concentrations in the mixed wastes to be stabilized is limited by the feed formulation designed for the final waste form to meet the TCLP levels. Envirocare said that they want to avoid any possible future liability. Therefore, they have a very conservative policy that requires decharacterized mixed waste to be also disposed in their mixed waste disposal facility.

Because wastes are not containerized in the disposal facility, waste come into direct contact with the workers. Thus worker exposure is the limiting factor in determining the radiological limits. As a result, Envirocare can accept only a subset of NRC's Class A waste (the Class with the lowest radiological contents). This restriction limits the range of mixed wastes which Envirocare can accept. As a comparison, at Barnwell SC, LLW are contained in NRC certified containers which is then placed in cement vault before placement in below ground trenches. Therefore, Barnwell is able to accept wastes with higher radiological concentrations. This will potentially enable Barnwell to accept a wider range of mixed waste once the mixed waste rule is implemented.

Envirocare targets its business for large quantity (over 1000 cubic ft) mixed waste generators. The primary source of Envirocare's LLW and LLMW are from environmental remediation activities at DOD, DOE and private industries. There is a railroad track that goes directly into the facility for incoming wastes. There are costs associated with treatability studies that are required prior to waste acceptance and treatment to ensure the final waste form to be disposed will meet the LDR level. Therefore, it's more cost effective for Envirocare to treat large quantity of a relatively uniform waste. Conversely, the unit cost for small quantity wastes is comparatively higher. Envirocare would not release its cost information asserting that it is private. A few of the nuclear power plants that we visited indicated encountering difficulties in shipping small quantity of wastes to Envirocare. This may be due to Envirocare's business decision to give priority to large quantity wastes, and the higher unit cost associated with small quantity wastes.

## Mixed Waste Treatment at Envirocare

Envirocare's mixed waste treatment processes include various kinds of stabilization technologies. They include conventional stabilization, polyethylene macroencapsulation, polyethylene microencapsulation, and kinetic mixer.

Conventional stabilization is done with various reagents including cement, clay, lime, and other materials for the purpose of meeting RCRA TCLP and NRC radiological leaching requirements. The primary types of wastes that have been stabilized through this method and disposed of at Envirocare have been soils, ashes, and slurry sludges. Envirocare has stabilized soils from various remediation sites, K061 dust, industrial boiler ashes from DSSI (a mixed waste treatment facility at TN); and various kinds of salt containing sludges from a couple of the DOE's facilities. The commonly seen RCRA metals are Pb and Cr. As stabilization does not treat organics, Envirocare places restriction on the organic contents of the incoming waste streams to ensure that the LDR requirements for the organics are met at point of disposal.

Envirocare has imported a few mixed waste treatment technologies from the DOE. These technologies included polymer macroencapsulation, polymer microencapsulation, and kinetic mixer. Envirocare macroencapsulated (using polyethylene) some of the DOE's radioactive lead in 1996 and 1997. Envirocare has started to test polymer microencapsulation and kinetic mixer technologies recently. Envirocare had encountered some challenges in meeting LDR requirements for some of the ashes from DSSI using the conventional stabilization reagents and

believes the polymer microencapsulation technology will resolve this problem. The kinetic mixer is a variation of polymer microencapsulation which allows processing of small quantity of wastes with large particle sizes and high moisture contents.

Both the Utah Department of Environment and EPA National Enforcement Investigation Center (NEIC) told us that Envirocare has been receiving waste at a faster pace then its treatment capacity is able to process. As a result, there are some wastes that have been stored on site longer then they should have been. Both the state of Utah and EPA NEIC have been working with Envirocare to increase their treatment capacity and capability. Envirocare said that sometimes they have to ask small quantity waste generators to hold off waste shipment while they are working on wastes from large quantity generators due to this limitation on treatment capacity. They also indicated that it is not cost effective for them to develop or invest in treatment capabilities for small quantity of wastes. This is consistent with what we have heard from some of the nuclear power plants that it is difficult for them to send waste to Envirocare. Envirocare said that they are starting to work with the nuclear power plant industry by identifying its needs.